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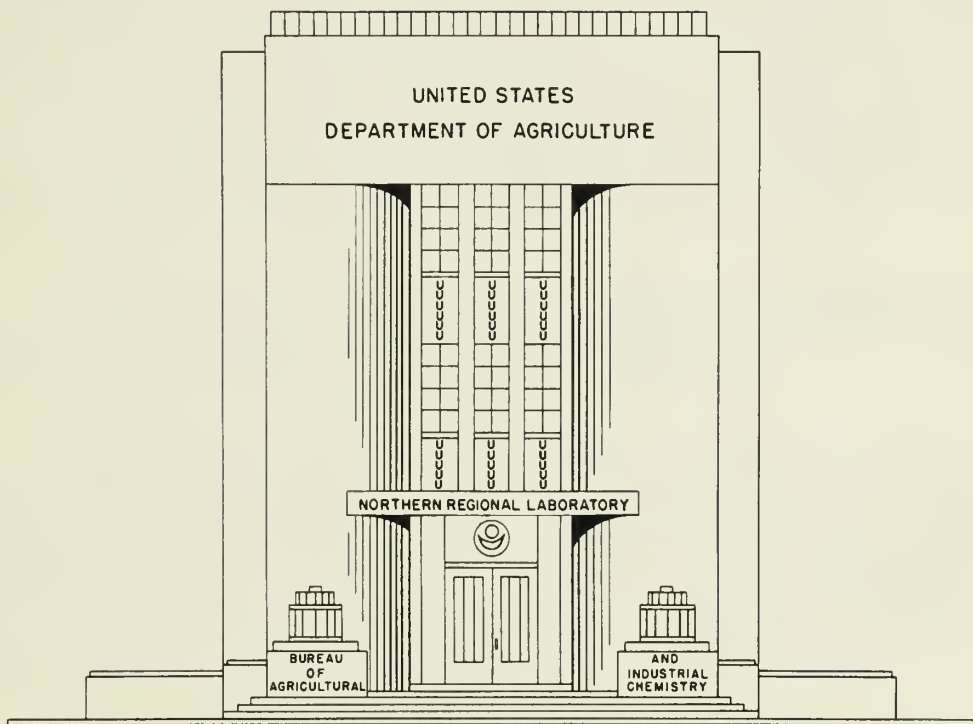
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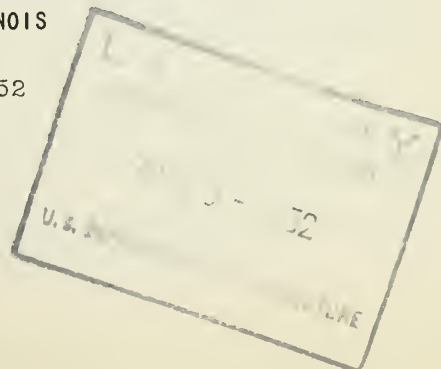
PULPS FROM STRAW AND SUGARCANE BAGASSE
FOR MANUFACTURE OF NEWSPRINT X



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PULPS FROM STRAW AND SUGARCANE BAGASSE FOR MANUFACTURE OF NEWSPRINT

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Newsprint is a generic term used to describe paper of the type generally used in the publication of newspapers. The term "standard newsprint paper" as used in paragraph 1772 of the U. S. Tariff Act of 1930 has been interpreted by the United States Customs Court to be that form, class, or standard of newsprint paper which was chiefly used for printing newspapers on or prior to June 17, 1930. The Treasury Department has defined this paper by definite specifications which are presented on page 237 in "The Dictionary of Paper" published under the auspices and direction of the American Paper and Pulp Association. This definition is particularly important from the standpoint of customs.

For many years before 1890 newsprint was made from straw pulp mixed with rags. After the process of preparing mechanical or groundwood pulp was discovered, this pulp was blended with straw pulp. Not long thereafter, however, the use of straw pulp was supplanted by wood pulp generally made by the sulfite process.

Present day newsprint is composed of a blend of from 80 to 88 percent mechanical or groundwood pulp which is produced by grinding bolts of wood on a stone in the presence of water. The yield of such pulp is in the neighborhood of 90 to 95 percent. Because of the high yield from the wood and the simplicity of manufacture, mechanical pulp represents our lowest-cost source of wood pulp. In order to produce a sheet of paper which can be made on the present high-speed, wide newsprint paper machines, it is necessary to add a certain proportion of stronger pulp produced by cooking pulpwood with chemicals. Ordinarily this is spruce or hemlock sulfite pulp.

The characteristics of opacity, ink absorbency, softness, and bulk in newsprint are mainly due to the mechanical pulp. Experience shows that chemical pulp does not have these qualities to the same extent as the mechanical pulp. On the other hand, it is possible to replace the spruce sulfite pulp with a bleached kraft pulp as is done in Australia and also, as we have discovered, with bleached straw pulp and with bleached sugarcane bagasse pulp. All of these chemical pulps have the property of giving a wet sheet strong enough to run through the presses and over the dryers in the present high-speed paper machines.

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While newsprint paper is considered one of the lower grades of printing papers, it is really a highly specialized product. It is manufactured on the largest paper machines and at the highest production speeds of any of our printing papers. Therefore, consideration must be given particularly to the qualities of the pulp required for such operating conditions. In use, newsprint must run on the modern high-speed printing presses with relatively few breaks. It must be capable of absorbing the cheap news inks rapidly and yet receive sharp impressions of types, cuts; and printing plates without blurring. It must have sufficient opacity so that little or no "show-through" (that is, printing on one side of the paper must not be easily discernible from the other). It must be relatively stable dimensionally for good register in color printing and be relatively clean and sufficiently bright to obtain good contrast and easy reading without eye strain.

Since newspaper advertising pays most of the cost of our daily newspapers, the advertisers are responsible to a considerable extent for those special qualities which have developed in newsprint requirements over the years. The paper makers, in cooperation with publishers, press manufacturers, and ink manufacturers have all contributed notably to the advances in newsprint quality. A change in the paper or in the way ink is absorbed by it will obviously affect its running qualities on the presses, its tendency to smear, its show-through, and other important characteristics.

There have been a number of proposals to make newsprint out of 100-percent chemically-pulped straw or bagasse or even chemical wood pulps, although wood pulps at present are not under consideration because of the pulpwood shortage. The action of chemicals in pulping is to remove from the raw material certain constituents which are responsible for the particular characteristics of groundwood. Chemically-produced pulps all have a different and lower ink absorption than mechanical pulp and, generally, less opacity although opacity can be increased by the use of filler material such as clay. Certainly, pulps can be produced from straw or sugarcane bagasse which can be made into paper of newsprint weight and which would run satisfactorily over the present printing presses. But such paper would not look like or behave like present standard newsprint and changes would have to be made in the types of ink used for printing. In addition, the cost of such paper would tend to level out at a price higher than that of present newsprint; although under emergency conditions, where entirely free markets may not exist, there might be periods during which such 100-percent straw or bagasse paper could be competitive with standard newsprint. Of course, in countries where mechanical pulps are not available, the publishers might very well be satisfied with a different type of sheet. After all, it is the publisher who will eventually decide whether a product differing from standard newsprint is acceptable to the newspaper trade.

Experiments conducted over the past 3 years by our Northern Regional Research Laboratory group, in cooperation with industry and with the Forest Products Laboratory, have a direct bearing on this subject. The first of these experiments was run at the request of the Ontario Paper Company, Thorold, Ontario, who manufacture the newsprint for the Chicago TRIBUNE and the New York DAILY NEWS. The company desired to determine, during the emergency in 1949 when the price of wood pulp was advancing so rapidly, if other raw materials besides pulpwood would be suitable as a supplement in newsprint manufacture. At that time a new chemical process for pulping straw had

been developed at this Laboratory. The process gave a higher yield of strong pulp than had been obtained by previous methods, and it was used for preparing the straw pulp on a commercial scale at the Ontario mill. This pulp, after screening, was given a mild bleaching treatment and was blended with the standard mixture of mechanical and spruce sulfite pulps to the extent of 17 to 20 percent of the total pulp used in making the paper. This blend was run on a large, high-speed, modern newsprint paper machine for 7 to 8 hours, producing from 35 to 40 tons of newsprint paper. No changes were required in the paper-machine operation and the straw pulp was entirely satisfactory from the standpoint of manufacturing operation. The paper so prepared was judged to be of somewhat better formation and smoother finish than standard newsprint. It was shipped to the Chicago TRIBUNE and run into 163,000 copies of a 28-page edition without a single break on the presses. The printing characteristics of the paper were enough improved over the standard sheet so that it was possible to determine by inspection which paper contained the straw pulp. This run proved definitely that bleached straw pulp can replace all or most of the spruce sulfite pulp as the chemical, strength-conferring constituent in standard newsprint, when used with fresh mechanical groundwood.

This Laboratory has entertained for some time the idea that it would be possible during an emergency and, indeed, in normal times to produce newsprint in another manner, using straw or bagasse pulp with deinked waste news. It was proven during World War II that under proper campaigning large amounts of waste paper could be collected at reasonable costs. For many years a variety of papers, particularly for magazines, have been manufactured by collecting printed magazine papers and deinking these by a chemical process. It is possible to do a satisfactory job of deinking waste printed newspapers. The pulp produced in this manner would supply the mechanical pulp characteristics which are so necessary in the present-day newsheet, and the chemical pulp required for giving the strength characteristics to the sheet could be supplied by the use of chemical straw or bagasse pulp.

In May 1951 in a cooperative project between the Forest Products Laboratory, Madison, Wis., and the Northern Regional Research Laboratory, Peoria, Ill., straw pulp prepared by a new, streamlined, simple process was blended with unprinted waste newsprint to produce newsprint paper. The straw pulp was obtained by digesting the straw in an open vessel for 1/2 hour at about 210° F. The pulp was then washed, screened, and bleached. The yields of straw pulp obtained were high as compared with conventional processes. The paper produced from a blend of 20 percent of this straw pulp and 80 percent of the waste unprinted news was produced on the experimental machine of the Forest Products Laboratory. The paper had considerably better formation than is usually found in newsprint and it also had better strength characteristics all around. The color of this paper using bleached straw pulp was considerably lighter than that obtained for the common newsprint. It would appear from this experiment that it is entirely feasible to produce what we would call standard newsprint today from a mixture of deinked waste newsprint and chemical straw pulp.

In order to determine that there would be no difficulty in replacing the softwood sulfite chemical pulp used in manufacturing standard newsprint by either bleached straw or bleached sugarcane bagasse pulp, some further experimental runs were made in a cooperative project between the Forest Products Laboratory and this Laboratory in November 1951. Newsprint was made from 20 to 30 percent of bleached straw pulp and bleached bagasse pulp blended with softwood and hardwood mechanical pulps. A control run using 20-percent softwood sulfite and the same mechanical wood pulps was made for

comparison. The newsprint produced from the straw and bagasse pulps blended with the groundwood pulps was fully equal to that produced with the all-wood furnish.

In connection with sugarcane bagasse, the Northern Regional Research Laboratory has under development a process for separating pith from the fibers of such bagasse as it comes from the sugar mill. The presence of pith in sugarcane bagasse ordinarily decreases the yield of pulp, increases the cost of bleaching, and causes a pulp of slower drainage on the paper machine.

To recapitulate, it has been shown that a paper having the properties of standard newsprint may be produced (a) by replacing part of the furnish in standard newsprint by bleached straw pulp; (b) by repulping unprinted newsprint paper and adding to this pulp 20 percent of bleached straw pulp--this indicates that it should be possible to manufacture satisfactory paper for use by the newspaper publishers by deinking newsprint and using either bleached straw or bleached sugarcane bagasse pulp to supply the chemical pulp required to give the necessary strength and life to the paper; and (c) it is indicated that virgin mechanical pulps made either from the conifers or from the hardwoods can be converted to satisfactory newsprint by the addition of 20 to 30 percent of either bleached straw or bleached sugarcane bagasse pulps, and this has been determined by trial runs on the experimental paper machine at the Forest Products Laboratory.

What we call standard newsprint cannot be made from 100-percent chemical pulp from any material, either softwoods, hardwoods, straw, bagasse, or other wastes since the chief properties of newsprint are dependent on the presence of the mechanical pulp. However, it is entirely possible to manufacture papers which can be printed and run on high-speed presses. It is probable that over a period the manufacture of such papers may prove to be more expensive than the manufacture of standard newsprint, and the deciding factor in the use of papers of this type depends on their reception by the public and particularly the willingness of publishers to contract over a period of years for the use of papers of this character.